

# Sample Chambers with Mother-Daughter Mode

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A set of eight stand-alone sample chambers with a common interface were constructed at LBNL for improved detection of alpha and fission decay chains over currently used designs. This system was more fully discussed recently in a LBNL report<sup>1</sup>. The stainless steel chambers (see Fig.1) were constructed to allow for low background detection of a daughter event by removal of the sample following the detection of a parent event. This mother-daughter mode of operation has been utilized successfully with our Merry-go-Round (MG) detection system<sup>2</sup>.

Each chamber contains a pair of detectors that sandwich the sample planchet. The detectors are mounted as close as possible to the sample to maximize geometric efficiency. The extent that this is possible is limited by the space required to allow for unhindered movement of the planchet. To reduce the total volume of the chambers, side mounted Ortec Ultra Alpha (Tu-021-450-100) detectors were used. The reported resolution for these detectors is 21 keV. They are biased at 50 volts positive. A microcomputer controlled solenoid-actuated valve system opens each chamber individually to the vacuum. The pressure in each chamber is monitored individually.

The sample planchet is inserted and removed from its position between the detector pair by a compressed air driven piston. All operation of the sample chamber system including the piston function is controlled by a microcomputer running LabView software.

A panel of eight, single throw switches controls the vacuum sub-system. This allows for individual opening of each chamber to vacuum and then starting data acquisition from this chamber.

The data acquisition system operates independently of the detector operation. This allows for the use of whatever acquisition system is currently being used at the experimental facility from which the data are being collected. As it was

intended to be first used in Cave 0 of the 88-Inch Cyclotron, the acquisition system would then be the GOOSY (GSI Online-Offline SYstem) software package developed at GSI<sup>3</sup> on a Digital Equipment VAX workstation running the VMS operating system. The interface between the crate and the workstation is the GSI crate controller, the CVC. The CVC is a CAMAC to VSB Computer with SCSI, Ethernet, VSB, and CAMAC interfaces.

## Footnotes and References

1. P. A. Wilk, C. M. McGrath, K. E. Gregorich, D. C. Hoffman, LBNL-48011 (2001).
2. K. E. Gregorich, M. R. Lane, M. F. Mohar, D. M. Lee, C. D. Kacher, E. R. Sylwester, D. C. Hoffman, Physical Review Letters, 72, 1423 (1994).
3. H. G. Essel, H. Grein, T. Kroll, W. Kynast, M. Richter, H. Sohlbach, W. Spreng, K. Winkelmann, W. F. J. Müller, IEEE Transactions on Nuclear Science, NS-34, 907 (1987).

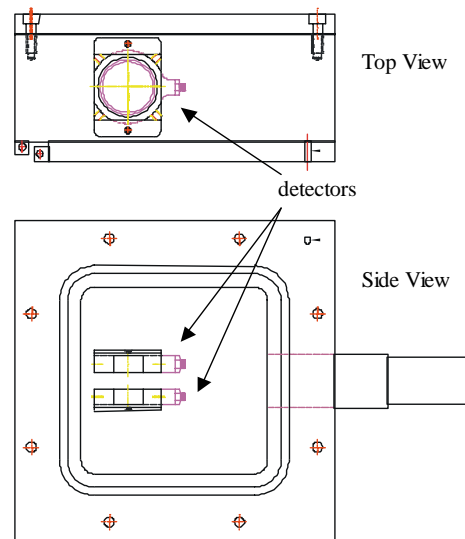


Fig. 1. Sample Chamber (C. M. McGrath)